User manual

Weighing module MW-01

Manual number:
ITKU-29-04-03-12-A

Modbus®

PROFI® PROCESS FIELD BUS

RADWAG®

BALANCES AND SCALES

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1. APPLICATION

MW-01 weighing module is intended for constructing industrial load cell scales. Depending on application, communication with the weighing module can be carried out through the following interfaces: RS232, RS485, Ethernet, Profibus or CAN. MW-01 is designed for cooperation with indicators series PUE 5, PUE 7 or PC computers.

Operating of the weighing module MW-01 from a PC level is carried out with a computer software **"MwManager"**. A detailed description of the application is included in the further section of the MW-01 user manual.

2. PRECAUTIONARY MEASURES

A. Please, read carefully this user manual and use the device according to its intended use;

B. Weighed loads should be placed possibly in the central setion of the weighing platform;

C. The weighng platform should be loaded with objects which gross weight does not exceed the maximal capacity of the scale;

D. Do not leave heavy loads on the weoghing patform for longer period of time;

E. In case of failure, immediately disconnect the power supply;

F. Devices that are to be decommissioned should be utilized according to valid legal regulations.

3. WARRANTY CONDITIONS

A. RADWAG is obliged to repair or change those elements that appear to be faulty because of production and construction reason,

B. Defining defects of unclear origin and outlining methods of their elimination can be carried out only in participation of the user and the manufacturer representatives,

C. RADWAG does not take any responsibility connected with defecting or loss deriving from unauthorized or inappropriate (not adequate to manuals) production or service processes,

D. Warranty does not cover:

- Mechanical failures caused by inappropriate exploitation of the device or failures of thermal or chemical origin or
- Defects caused by atmospheric discharge, overvoltage in mains or other random event,
- Maintenance activities (cleaning of the weighing module).

E. Warranty loss appears if:

- A repair is carried out by an unauthorized service,
- Intrusion into mechanical or electronic construction of unauthorized people,
- Removing or destroying protection stickers for the weighing module

F. The detailed warranty conditions are listed in the warranty certificate.

G. Contact with Authorized Service: +48 48 384 88 00 ext. 106 or 107.

4. TECHNICAL PARAMETERS

MODEL	**MW-01 ver.1**	**MW-01 ver.2**
Interface	RS232, RS485, Ethernet	RS232, PROFIBUS, Ethernet
Power Supply	8 ÷ 30VDC	
Housing	metal	
IP rating	IP 66	
Working temperature	-10°C ÷ 40°C	
OIML class	III	
Number of verification intervals	10 000	
Max. increase of input signal	19,5mV	
Min. voltage per verification division	0,5µV	
Min. load cell impedance	80Ω	
Max. load cell impedance	1200Ω	
Load cell excitation voltage	5VDC	
Load cell connectivity	4 or 6 wire shielded cable	
Number of weighing platforms	1	
2INE/3OUT	Standard	
Transmission Speed RS232 RS485	Default 57600 bit/s	

4.1. INPUT/OUTPUT parameters

The module features 2 optoisolated inputs, 2 reed relay outputs and fast transistorized output type open collector.

OUT1 – OUT2 Parameters	
Number of outputs	2
Type of outputs	Reed operating contact
Conductor intersection	0.14 – 0.5mm^2
Maximum switchable current	200mA
Maximum conducted voltage	50VDC

Output OUT3 Parameters	
Number of outputs	1
Type of outputs	Transistor
Umax	5VDC
Imax	100mA

Input Parameters	
Number of inputs	2
Type of inputs	Optocoupled
Conductor intersection	0.14 – 0.5mm^2
Control voltage range	5 -24V DC

5. CONSTRUCTION

MW-01 weighing module features metal housing. The signal conductors are let out through glands. MW-01 communicates with external devices through one of accessible interfaces: RS485, RS232, Ethernet, Profibus or CAN.

The weighing module enables cooperation with indicators or PC computers. It features 2 optoisolated inputs, 2 reed relay outputs and one fast transistor output. The weighing module is supplied form 8÷30VDC.

5.1. External view

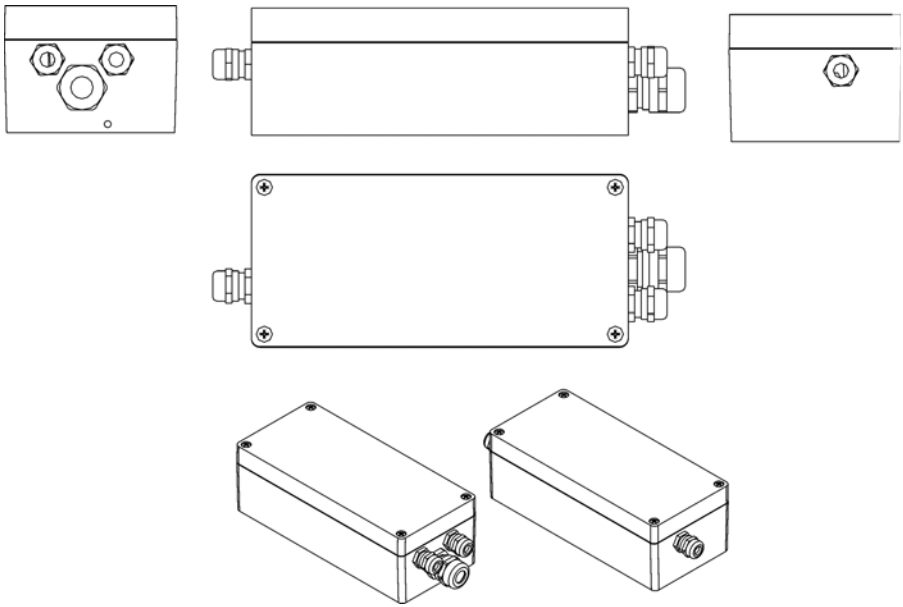


Fig.1 Weighing module MW-01

5.2. Dimensions

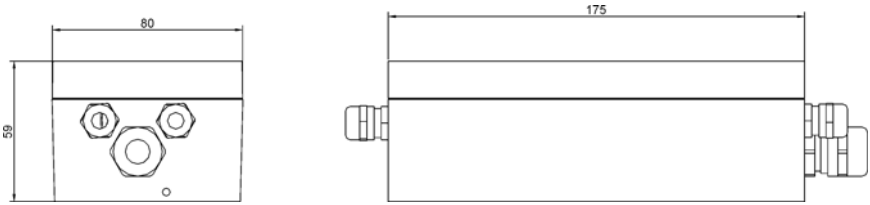
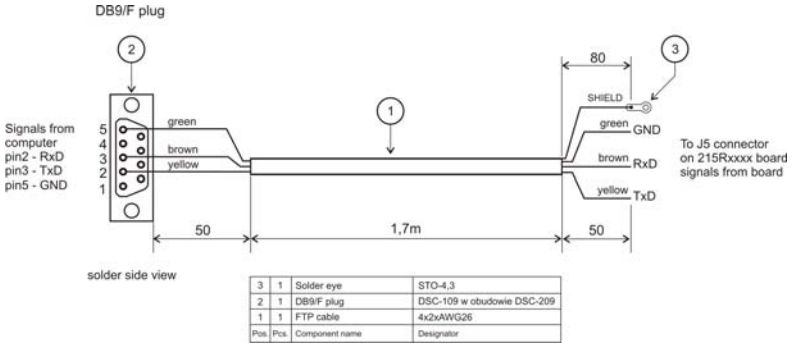


Fig.2 Dimensions of the MW-01

5.3. Diagrams of connection cables

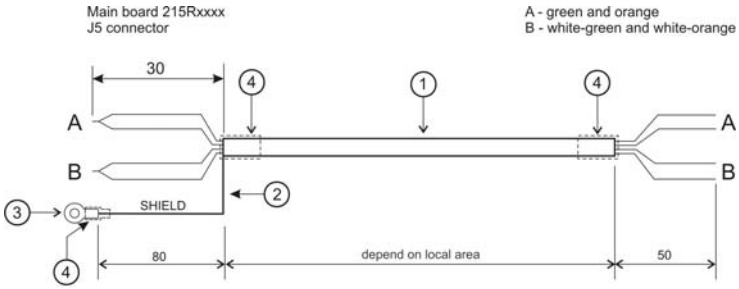
RS232 cable



Pos.	Pcs.	Component name	Designator
3	1	Solder eye	STO-4,3
2	1	DB9/F plug	DSC-109 w obudowie DSC-209
1	1	FTP cable	4x2xAWG26

Fig. 3 PT0145 Cable

RS485 cable



Pos.	Pcs.	Component name	Designator
4	x	Insulation	RC 9,5/4,8
3	1	Solder eye	STO-4,3
2	1	Single cable	LgY 500V 0,35mm2
1	1	FTP cable	4x2xAWG26

Fig. 4 PT0012 Cable

Ethernet cable

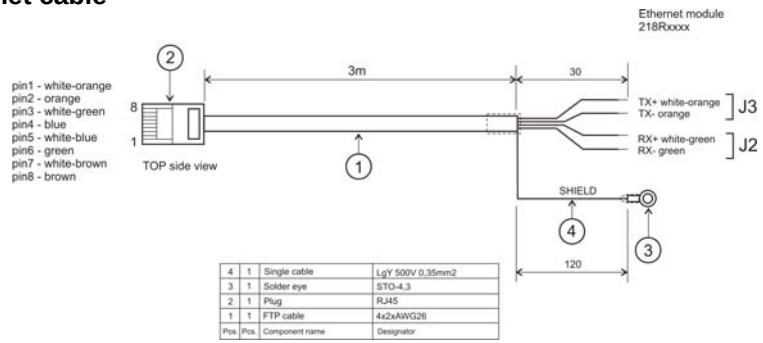


Fig. 5 PT0014 Cable

IN/OUT cable

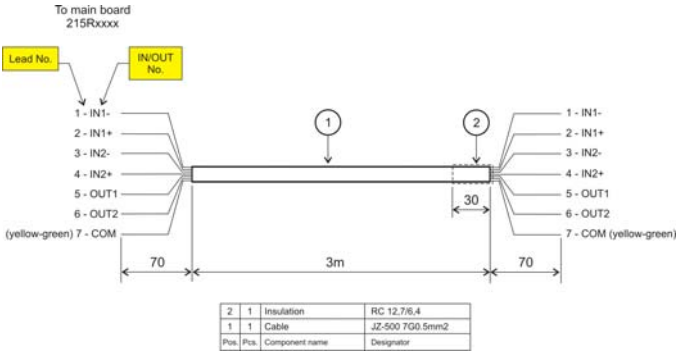


Fig. 6 PT0146 Cable

Power cable

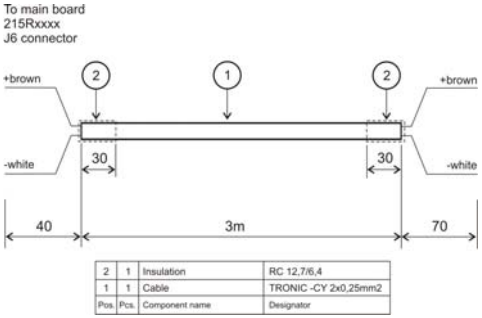


Fig. 7 PT0147 Cable

6. INSTALLATION of “MwMANAGER” software

Caution:

- *In order to install the program on the computer with older version **“MwManager”** softwre, uninstall the previous version first,*
- *The installation instruction was made for Windows 7 and it is compatibile with former versions of MS Windows*
- *Proper operation of the program reguires installing Microsoft .NET Framework ver. 2.0 or higher. It is accessible on Microsoft website: http://www.microsoft.com/downloads/details.aspx?displaylang=pl&FamilyID=0856eacb-4362-4b0d-8edd-aab15c5e04f5*
- *Proper operation of the program reguires installing all accessible ServicePacks for your operating system.*
- *Due to continuous software updates there may occur some discrepancies between the instruction and the program,*
- *RADWAG takes no responsibility for the consequences of the software operation, and any errors resulting from the incorrect software operation,*
- *RADWAG takes no responsibility for loss or protection of any data caused by the incorrect utilization of the software or computer.*

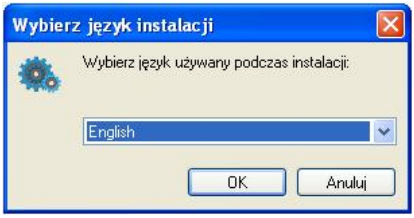
6.1. Minimal hardware requirements

Proper operation of the software requires a computer with below specified configuration:

- A PC computer with installed OS MS Windows 2000/XP/2003/Vista/7,
- processor 2.4 GHz or faster,
- RAM 512 MB or more (recommended 1 GB),
- At least 1 GB of free space on the hard drive,
- Display with minimum resolution 800 x 600,
- DVD drive.

6.2. Installation procedure

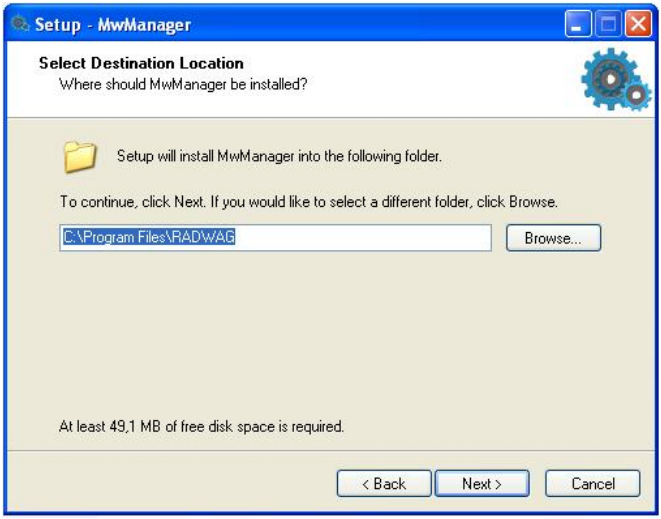
1. On receiving an installation file of **MwManager x.x.x.x.exe** software, run installation file, select language version and press OK key.



2. Press Next > in the welcome window:

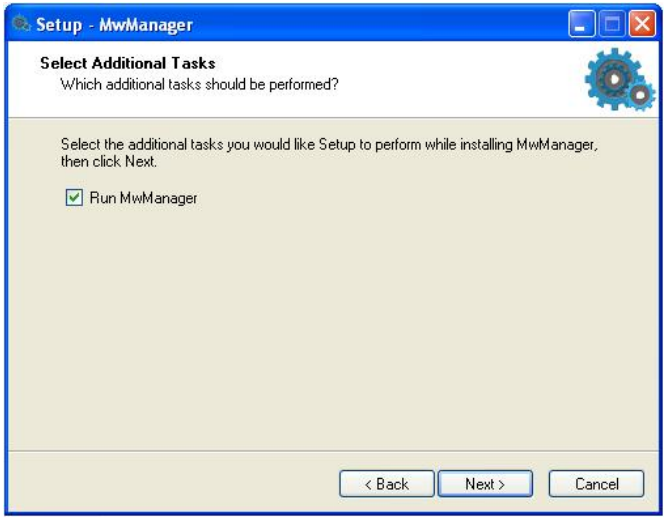
Setup - MwManager
Welcome to the MwManager Setup Wizard
This will install MwManager 1.0.2.1 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

3. Browse window:


Setup - MwManager
Select Destination Location
Where should MwManager be installed?
Setup will install MwManager into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files\RADWAG
Browse...
At least 49,1 MB of free disk space is required.
< Back
Next >
Cancel

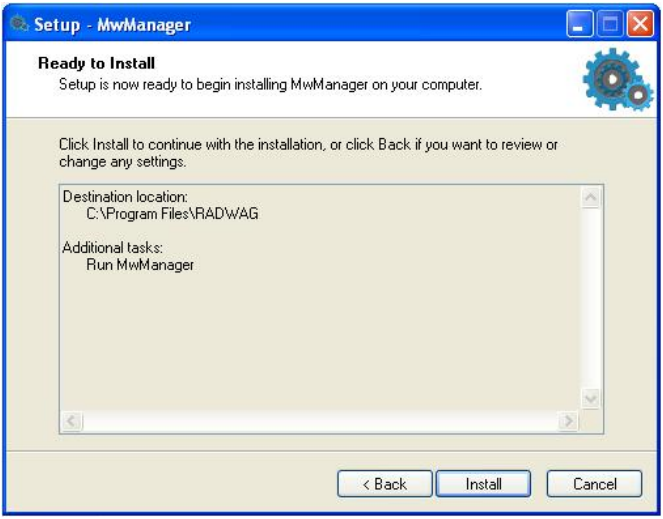
If necessary, change the software insallation folder, and press Next >.

4. Window for selecting tasks:


Setup - MwManager
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing MwManager, then click Next.
Run MwManager
< Back
Next >
Cancel

On marking / unmarking available option, press Next > key.

5. Installation window:


Setup - MwManager
Ready to Install
Setup is now ready to begin installing MwManager on your computer.
Click Install to continue with the installation, or click Back if you want to review or change any settings.
Destination location:
C:\Program Files\RADWAG
Additional tasks:
Run MwManager
< Back
Install
Cancel

In order to install the software, press **„Install"** key.

6. Software installation completion window:

Setup - MwManager
Completing the MwManager Setup Wizard
Setup has finished installing MwManager on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Finish

To finish installation process, press **„Finish"** key.

7. A shortcut will be created on computer's desktop.

7. PC PROGRAM DESCRIPTION

Operation of the weighing module from PC computer level requires application "**MwManager"**. The application can operate in MS Windows environment with installed add-on **.NET framework 2.0**. The program enables calibrationg the module, displaying current mass indication, tarring, zeroing, setting filters and functions for corresponding inputs and outputs.

Caution:

1. *This manual complies with the software **"MwManager"** starting from version **1.0.2.1** and weighing module program **Prj215** from version **2.2**.*
2. *The entered values are accepted by pressing **Enter** key. The changes are saved in the weighing module on pressing **Save** key. All temporary parameters settings that are not saved in the weighing module are highlighte in red.*

7.1. Weighing window

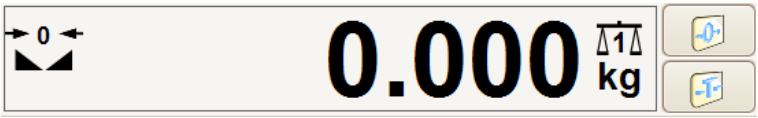


Fig.8 View of the software's weighing window

On completing initializating procedure, the weighing window displays below pictograms:

- precise zero indication
- stable measurement result
- weighing unit
- weighing platform number

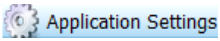
If the indication is other than zero – press the **zeroing** key.

Function keys:

- Zeroing

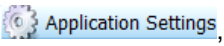
- Taring

7.2. Application settings

Tab 

comprises the settings for conneting the weighing module, choosing interface language version and other software options.

7.2.1. Connection settings

In tab 

,

key opens a window for establishing connection with the weighing module.

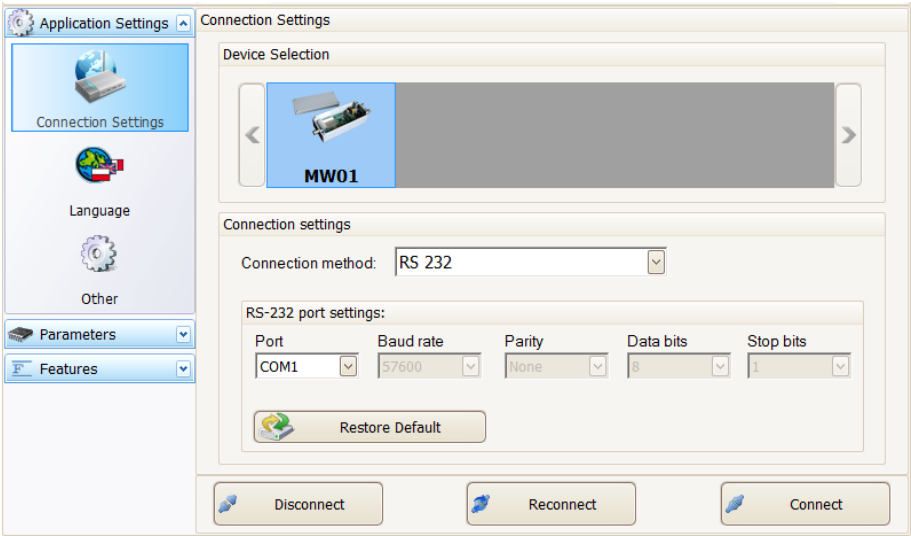


Fig.9 Connection settings' window

Description:

Means of connection	Interface for connecting to the weighing module
RS 232	Connection via port RS232
TCP/IP	Ethernet connection
RS 485	RS 485 connection
Offline	The offline mode is used for saving and editing all indispensable parameters of the configuration file.

RS232:

Port	Choosing a COM port number to which the weighing module is plugged
Baud rate	Baud rate for the RS232 interface. **57600** bps by default
Parity	Parity bit parameter. “None” by default
Data bits	Number of data bits. 8 by default
Stop bits	Number of stop bits. 1 by default

TCP/IP:

Adres IP	IP address of the device, default setting **192.168.0.2**
Port	Port set in the weight module, default setting **4001.**

RS485:

Port	Choosing a COM port number to which the weighing module is plugged
Baud rate	Baud rate for the RS485 interface. **57600** bps by default
Address	Weighing module address in the net

Caution:

1. *The default baud rate of RS232 and RS485 interfaces in the **MW-01** is set to **57600** bps;*
2. *If case of problems with establishing a connection to the weighing module, set and check accessible baud rates or connect through Ehternet interface;*
3. *If the display is set to port RS232, then connecting the computer software through the same port is impossible. Display operation on this port is restored on restarting the module (unplugging and repeated plugging to mains).*

Keys description:

Disconnect	Communication disconnected
Reconnect	Switching off and on (communication restart) communication with the device
Connect	Establishing connection with the weighing module

7.2.2. Language

Use tab Application Settings, and Language key to open a window enabling changing the language of the software.

Fig.10 Language selection window

On selecting the language version, press **"Apply"** key to save the changes.
Accessible language versions:

- Czech
- English
- French
- German
- Polish
- Spanish

7.2.3. Other

Use tab Application Settings, Other key to start other software options.

Fig.11 Other options window

Tick **"autostart"** option, so that on switching on the software automatically connects to the weighing module, by the default of last activated means of connection.

7.3. Parameters

Tab Parameters comprises all factory and user parameters, and also the communication parameters of the weighig module and functions of 2 inputs and 3 outputs.

7.3.1. User Parameters

Use tab Parameters, User parameters key to open a window with user parameters of the weoghing module. The parameters are visible and edittable for each software user.

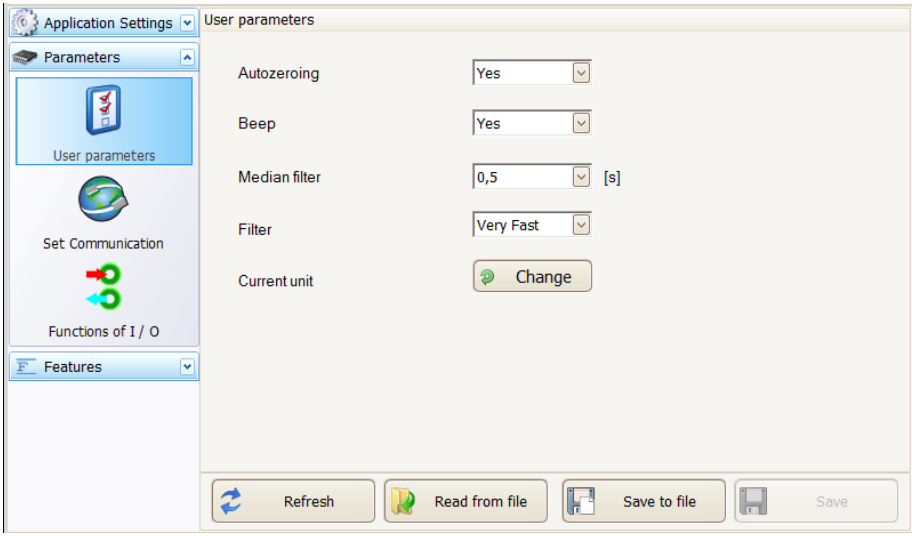


Fig.12 User parameters window

List of user parameters:

Autozeroing	-	tick to enable autozeroing
Beep	-	Sound signal
Median filter	-	tick to enable median filter
Filter	-	tick to enable averaging filter
Current unit	-	Toggling between weighing units in the weighing window

7.3.2. Communication settings

Use tab Parameters, Set Communication key to open a window with communication parameters of the weighing module and configuration of peripheral devices. The parameters are visible and edittable to all software users, who establish cmmunication with the weighing module.

- **Ethernet**

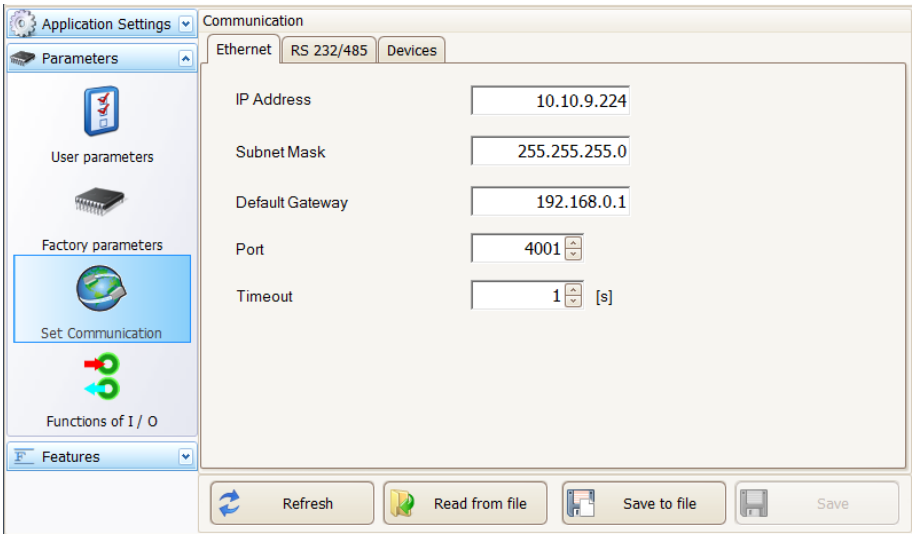


Fig. 13 Communication parameters window for Ethernet

List of fields with description:

IP address	-	Device's IP address, default **192.168.0.2**
Subnet mask	-	Ethernet subnet mask, default **255.255.255.0**
Default gate	-	Ethernet default gate, default **192.168.0.1**
Port	-	TCP communication port, default **4001.**
Timeout	-	Inactivity time in which the device breaks communication, expressed in seconds, range 0 – 300 [s].

- **RS 232/485**

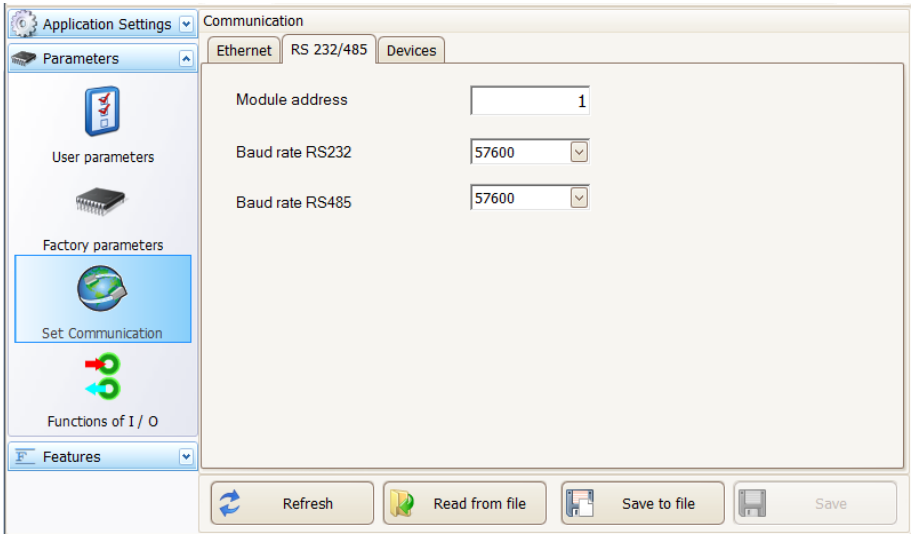


Fig.14 RS 232/485 comunication parameters window

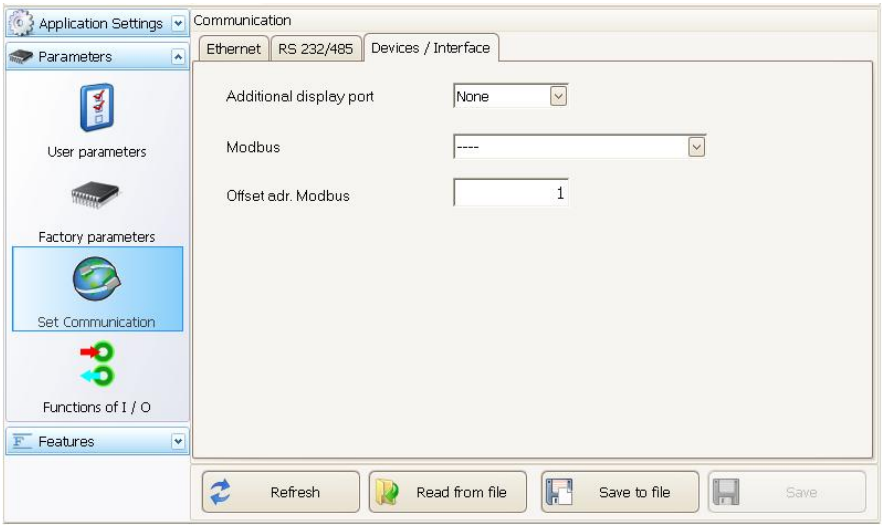
List of fields with description:

Module address	-	Weighuing module address in RS 485 network (the network requires setting different address for each of the devices), default set to 1. Available range from 1 to 254.
Baud rate RS232	-	Baud rate setting for RS 232 communication interface. Default **57600** bps
Baud rate RS485	-	Baud rate setting for RS 485 communication interface. Default **57600** bps

Caution:
*Indicator series PUE7 and other devices may use the address for Ethernet connection (TCP/IP) and connection through RS232. In such case, set parameter „**Module address**" to default value **1** for MW-01 and in the settings of PUE7.*

On changing the communication parameters, save the settings and restart the weighing module (by unplugging and repeated plugging to mains), so that the inserted changes are effective. Remember, that the new parameters are inserted in the connection settings window with the weighing module.

- **Devices / Interface**



List of fields with description:

Additional display port	-	Interface setting for the additional display for the communication protocol of LCD display.
Modbus	-	Selecting Modbus protocol type and operating interface,
Offset adr. Modbus	-	Offsetting memory addressing for Modbus protocol, Default value **1** for correct operation of PLC controller. ***Caution!*** In case of testing software ProfiModBusTester set the value to **0**. Available values **0** - **255**.

7.3.3. Functions I/O

The weighing module features two inputs and three outputs.

Use tab Parameters, Functions of I / O key to open a window enabling software user to access configurating functions of the weighing module inputs and outputs.

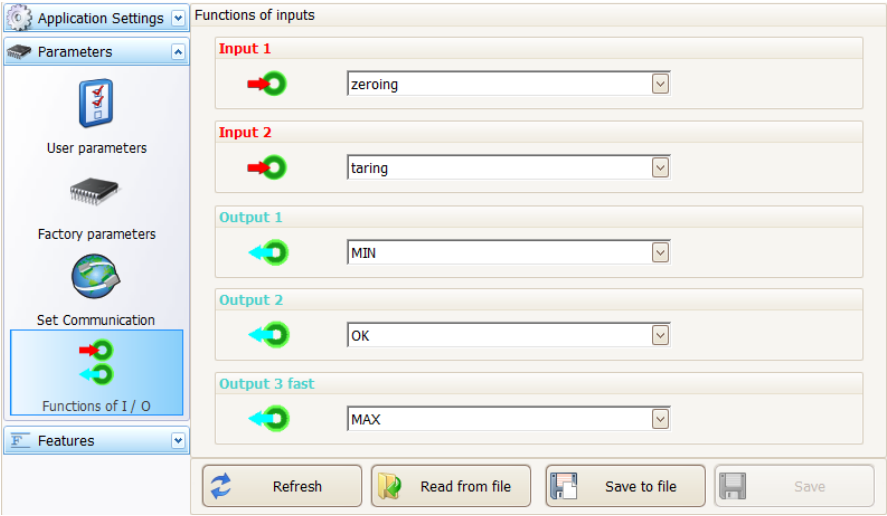


Fig.15 I/O configuration window

- **Inputs' configuration**

  Accessible input functions:

No	Input inactive
Tarring	Platform tarring
Zeroing	Platform zeroing
Start dosing	Initiate batching process
Stop dosing	Stop batching process

- **Outputs' configuration**

  Accessible output functions:

None	Output inactive
Stable	Signalling stable weighing result over LO limit
MIN stable	Signalling stable weighing result over LO limit but below MIN limit
MIN	Signalling unstable weighing result over LO limit but below MIN limit
OK stable	Signalling stable weighing result between MIN and MAX limits
OK	Signalling unstable weighing result between MIN and MAX limits

MAX stable	Signalling stable weighing result over MAX limit
MAX	Signalling unstable weighing result over MAX limit

Notice:
If a function is assigned to a specific output and the same output is used for bulk or fine dosing then on batching start and continuation, the outputs will be activated compatibly to the dosing parameters. End of dosing process causes switching over the functions to outputs.

7.4. Functions

Use tab Features to functions of dosing (batching), checkweighing, inputs and outputs status and simulation.

7.4.1. Dosing

Use tab Features, Dosage key to open a window enabling setup of dosing process.

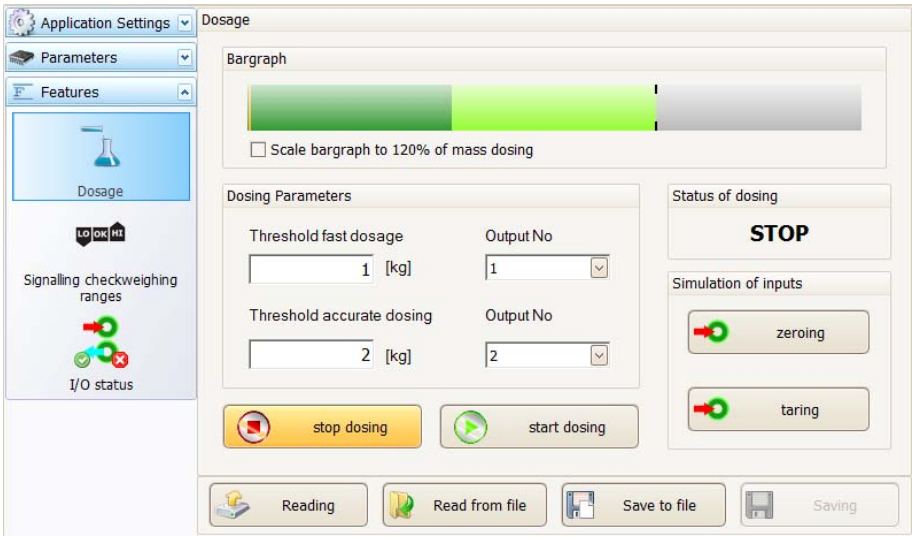


Fig.16 Window of dosing parameters

- **Bar graph**

  The dosing window features a graphic bar visualizing mass indication within the weighing range of the weighing module

  Ticking the additional option extends bar graph scaling to 120 % of the maximum dosing limit. If the fine dosing threshold is disabled, then the bar graph is scaled according to the bulk dosing criteria.

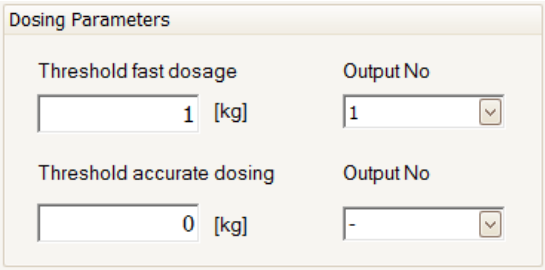


Fig.17 Bar graph scaling for bulk dosing limit

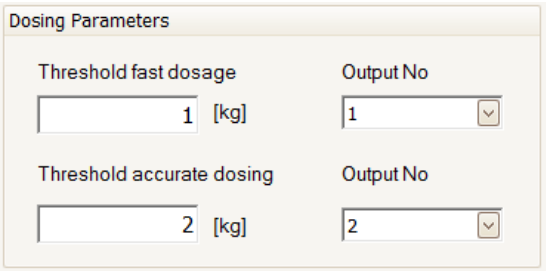


Fig.18 Bar graph scaling for bulk and fine dosing limits

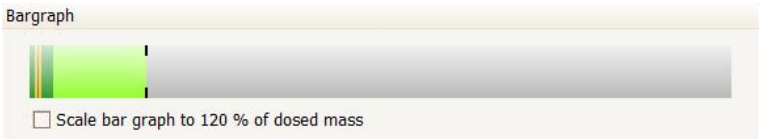


Fig.19 Bar graph for low weight without scaling

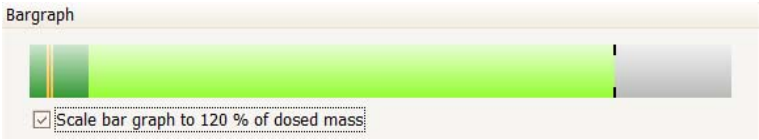


Fig.20 The same bar graph with enabled scaling option

- **Dosing parameters**

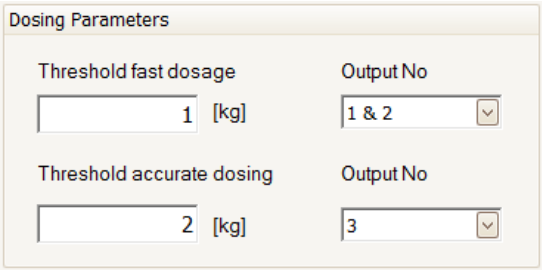


Fig.21 Window for setting dosing parameters

The dosing process can consist of one or two phases depending on the needs.

List of fields with description:

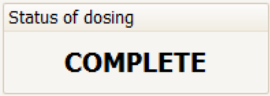
Bulk dosing limit	Mass value for which the high state of selected outputs is set in the first dosing phase,
Output No. for bulk dosing	Selection of output or outputs numbers assigned to the first dosing phase,
Fine dosing limit	Mass value for which the high state of selected outputs is set in the second dosing phase,
Output No. for fine dosing	Selection of output or outputs numbers assigned to the second dosing phase,

Accessible outputs for specific dosing phase:

1	High state on the first reed relay output
2	High state on the second reed relay output
3	High state on the third transistor output
1 & 2	Activating the first and second reed relay output
1 & 3	Activating the first reed relay output and the third transistor output
2 & 3	Activating the second reed relay output and the third transistor output
1 & 2 & 3	High state for all outputs
-	Dosing switched off for specific limit

- **Dosing status**

  The dosing status window displays the current status of dosing process

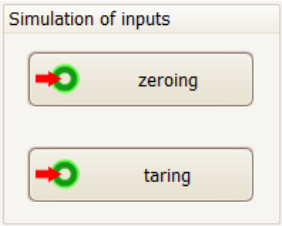


Description:

Dosing status	Dosing process status: DOSING – dosing in progress DISCONTINUED – dosing terminated by pressing STOP key. STOP – dosing stoppage, COMPLETED – Dosing completed.

- **Simulation of inputs' operation**

  Inputs simulation enables simulating the operation of a function assigned to a specific input. The first input corresponds to the upper key, and the bottom key simulates operation of a function assigned to the second input.



- **Dosing simulation**

  The lower part of the window comprises keys for starting and stopping dosing process independently on the functions assigned to the inputs. They enable starting and stopping the dosing process.

7.4.2. Checkweighing

Start option Features and press Signalling checkweighing ranges key to open a window enabling checkweighing setting.

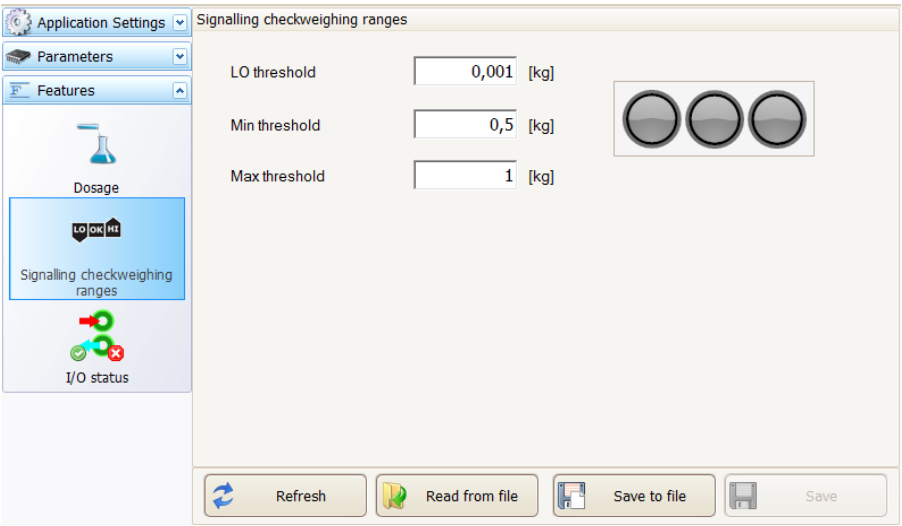


Fig.22 Checkweighing settings window

List of fields with description:

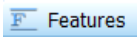
LO limit	Output signals MIN, OK, MAX only if it is over (net) LO limit
Min limit	Net mass value below which the MIN limit is signalled, above OK
Max limit	Net mass value for which the OK limit is signalled, above MAX

Signalling function with limits:

	MIN
	OK
	MAX

Caution:
The checkweighing signalization in the software is accessible on setting the functions to outputs.

7.4.3. Input/output state

Start option 

and press

key to open a window enabling setting the input and output signalling and setting output status.

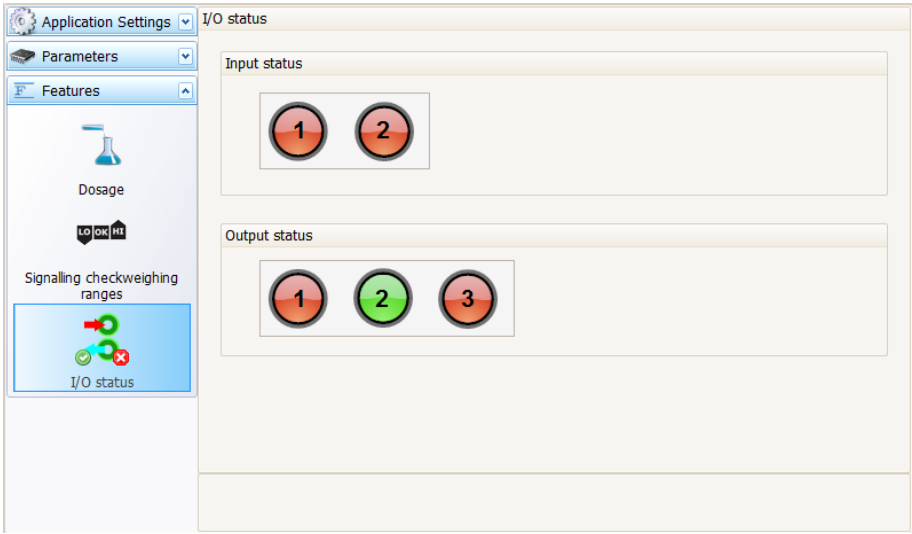


Fig.23 Window of inputs and outputs status

Software inputs and outputs are numbered according the weighing module documentation.

	Active input / output (high state)
	Inactive input / output (low state)

The simulation of output operation is possible on pressing the output number which is activated immediately, provided there is no function assigned to the output.

The simulation of inputs is accessible in the dosing window.

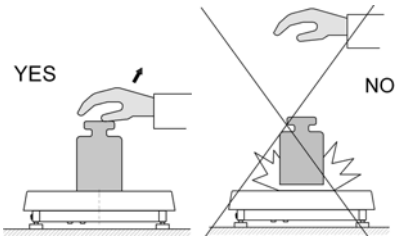
8. WEIGHING

Place weighed load on the weighing platform. As the stable measurement pictogram is displayed, read the measurement result.

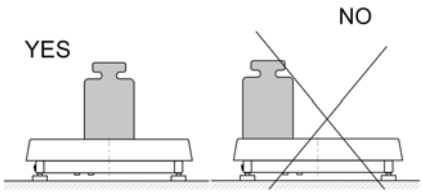
8.1. Terms of use

In order to ensure a long lasting operation and correct measuring of weighed loads it is advised to:

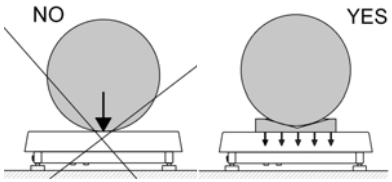
- Place the loads on the weighing platform gently and shocklessly:



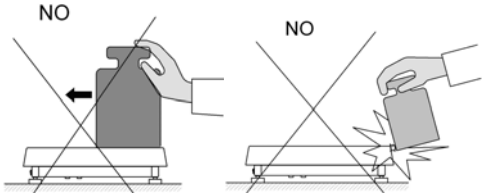
- Place the loads in the centre of the weighing platform (eccentric weighing errors are outlined in the norm PN-EN 45501 sections 3.5 and 3.6.2):



- Do not load the weighing platform with concentrated force:



- Avoid side loads and particularily side shocks:



8.2. Zeroing

In order to zero the mass indication in program **„MwManager”** press key in the weighing window (the top right corner) or recall the zeroing function. The display should indicate mass equal to zero and pictograms: →0← and ◣◢ should be displayed.

Zeroing is equivalent to setting a new zero point comprehended by the scale as a precise zero. Zeroing is possible only for stable display status.

Zeroing can be carried out by pressing the external push-button connected to an input configured to zeroing function.

Caution:
Zeroing display status can only be carried out within the ***±2%*** *of the maximal scale capacity. If a zeroed indication is beyond the range* ***±2%*** *of maximal scale indication, the display indicates error message* ***Err2****.*

The procedure of defining inputs - keys is described in section 6.3.3 of this manual.

8.3. Tarring

In order to determine net weight place a container on the weighing platform and on indication staibilization press key or recall the tarring function. The display should indicate mass equal to zero and pictograms: ***Net*** i ◣◢ should be displayed.

While using tarring function pay attention not to exceed the maximal measuring range of a scale. When taking the load and its packaging off the weighing platform the display indicates value that is a sum of tarred weigts preceded by minus sign.

Tarring can be carried out by pressing the external push-button connected to an input configured to tarring function

Caution:
Tarring cannot be carried out if the scale display indicates zero or negative values. In such case the display indicates error message ***Err3****.*

The procedure of defining inputs - keys is described in section 6.3.3 of this manual.

8.4. Weighing on dual range scales

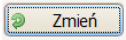
Switching between the **1st range** and the **2nd range** takes place automatically, without operator's interference, at the point of reaching the Max of the **1st range**.

Weighing in **range II** is signalled by displaying pictogram →|2|← in the top left corner of the display. When unloading the weighing platform, the indication returns to zero. Weighing in the **2nd range** continuous until the indication returns to AUTOZERO zone.

Fig. 24 Weighing window in the 2nd range

When in AUTOZERO zone, the indication retirns to precise zero, which is signalled by pictogram →0← and pictogram of the **2nd range** →|2|← disappears from the display. Weighing returns automatically to the **1st range**.

8.5. Toggling between weight units

The weight unit can be changes in the main window of **"MwManager"** software by pressing  key.

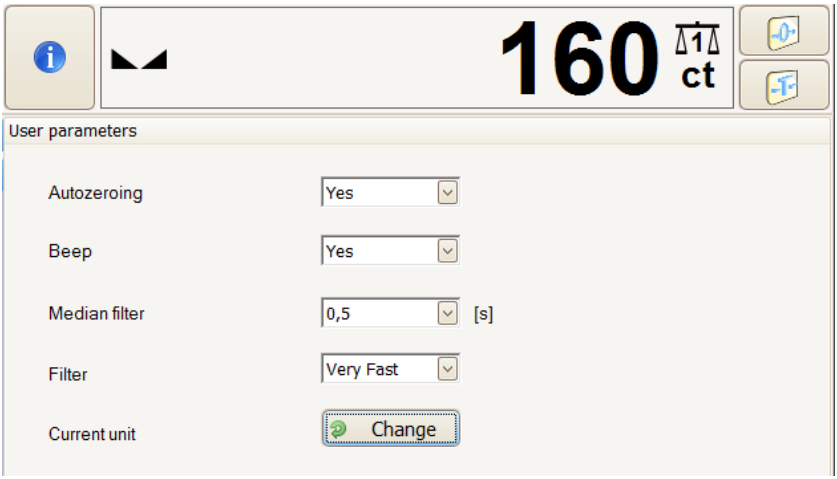


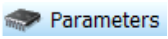
Fig. 25 The main window with changed weighing unit

Selection options:

- If the basic weighing unit [kg], the following units are accessible: [kg, lb, oz, ct, N, g]. F*or verifies scales, [lb, oz, N] are not accessible*;
- If the basic weighing unit is [g], the following units are accessible: [g, kg, lb, oz, ct, N] F*or verifies scales, [lb, oz, N] are not accessible.*

9. SCALE PARAMETERS

Users can adjust the scale to ambient conditions (filtering level) or user needs (autozero operation) and also determine the minimum weight limit for operation of some basic scale functions.

The parameters are accessible in tab 

>

.

List of scale parameters:

- Autozero
- Median Filter
- Filter

9.1. Autozero function

In order to ensure precise scale indications the software “AUTOZERO” function has been introduced. It is designed to automatically control and correct scale’s zero indication.

When autozero function is enabled, the subsequent results are compared in constant time intervals. If two subsequent results differ less than the declared AUTOZERO range the scale automatically sets new zero point and pictograms of stability – and zero state – → 0 ← are displayed.

If AUTOZERO is enabled, then each measurement always starts from the precise zero point. There are, however, cases in which the function may disturb measuring process. It is for instance while very slow loading the weighing platform (for instsance pouring a load). In such case the zero correcting set can correct the actual indication of load placed on the scale’s weighing platform.

Procedure:

- Enter the **User parameters** window by pressing

key, choose parameter **<Autozeroing>** and set the appropriate value.

Accessible settings:

NO - autozero disabled
YES - autozero enabled

9.2. Median filter

The intended use of the median filtering is eliminating shortlasting interference of impulse character (e.g. mechanical shocks).

Procedure:

- Enter **User parameters** window by pressing

key, choose parameter **<Median Filter>** and set its appropriate value.

Accessible settings:

None - median filter disabled
0.5, 1, 1.5, 2, 2.5 - median filter enabled

9.3. Filter

The intended use of the averaging filter is adjustment to existing ambient conditions.

Procedure:

- Enter **User parameters** by pressing

key, choose parameter **<Filter>** and set its appropriate value.

Accessible settings:

No, Very Fast, Fast, Average, Slow

Caution:
The higher filtering level the longer stabilization time of measurement result.

10. CHECKWEIGHING

Checkweighing is a function that aims at precise weighing a sample with pre-defined low anf high weighing limits (checkweighing thresholds (LO – sample mass too low, HI – sample mass too high, OK – sample mass correct).

Signalling checkweighing ranges

Such software solution is a very good means for quick mass value evaluation with no need for contiinuous monitoring the measurement result. The above mentioned weighing status (LO, OK, HI) have their graphic visualization presented on scale's display.

The status is also indicated by optical signalization or controlled by the set of external devices.

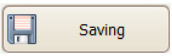
Fig. 26 Illustration of intervals for checkweighing function

Caution:
The checkweighing configuration is described in section 7.4.2 of this manual.

10.1. LO limit

Parameter **<LO limit>** determines the net weight indicated on the display which activates opertaion of outputs for status MIN, OK, MAX.

Procedure:

- Enter parameter **<LO limit>,** insert the value of **LO** limit and press **Enter** key. Save changes using 

key.

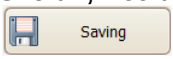
10.2. MIN/MAX limit

Parameter **<MIN limit>** in checkweighing determines the net weight limit for which the checkweighing status is switched between MIN and OK.

Parameter **<MAX limit >** in checkweighing determines the net weight limit for which the checkweighing status is switched between OK and MAX.

Output signalization is activated over the set net value of **LO LIMIT**.

Procedure:

- Enter parameter **<MIN threshold>** or **<MAX threshold>,** insert the limit value and press **Enter** key. Save changes using 

key.

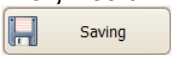
11. DOSING

Dosing is a function enabling precise load measurement to a pre-defined target value.

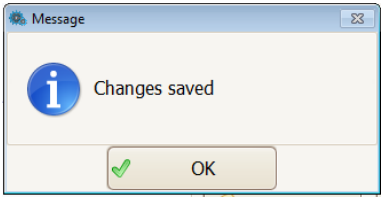
Parameter **<Bulk dosing limit>** determines in fast (bulk) dosing the value of net mass for which one or a few outputs are activated.

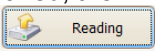
Parameter **<Fine dosing limit>** determines in slow (fine) dosing the value of net mass for which one or a few outputs are activated.

Procedure:

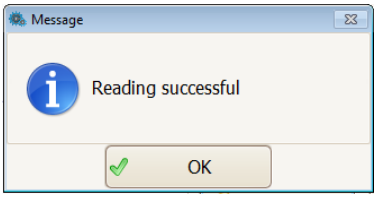
- Enter parameter **<Bulk dosing limit>** or **<Fine dosing limit>,** insert the limit value and press **Enter** key. Save changes using 

key.
- Changes are confirmed by a message box:



- If any changes in limits values are introduced and but not saved, then it is possible to preview the currently set limits by pressing 

key.
- The readout is confirmed by a message box:



Caution:
The dosing function and its parameters are described in section 7.4.1 of this manual.

12. PARAMETERS IN FILE

"MwManager" software features saving set parameters in a file format ***.sav**. The function can be utilized for saving weighing module settings in a backup copy, which is restorable in case of module defect or further utilization of the parameters while configuring larger number of weighing modules.

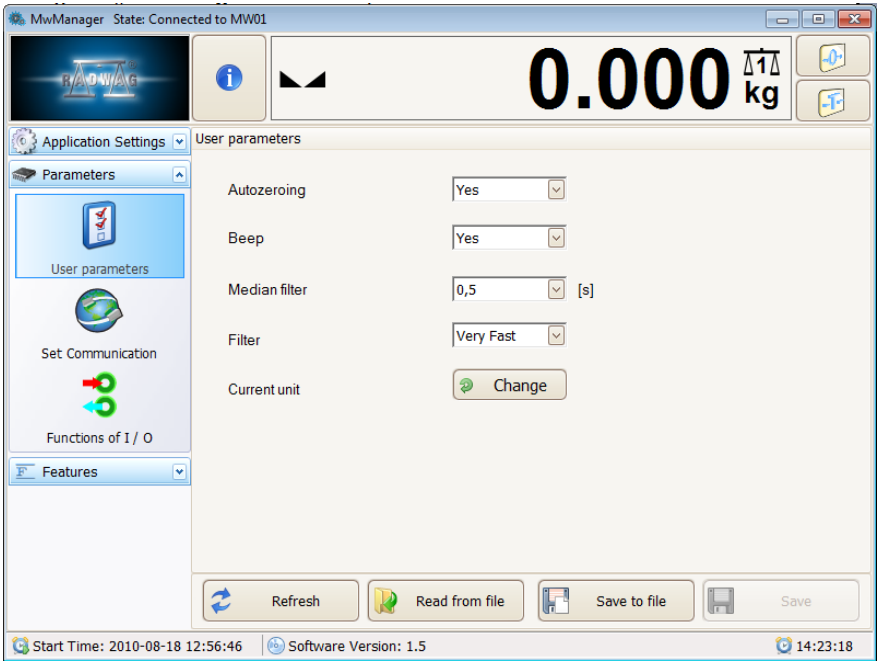


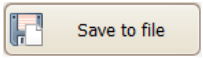
Fig.27 An instance of a windpw with accessible option for saving and uploading a file

File format:

MW01_(factory number)_YY-MM-DD_HH-MM.sav

12.1. Saving to file

Procedure:

- As the weighing module parameters are set, press 

key to save them in a file.
- Then, using system operation window browse for file saving directory, and press

key.

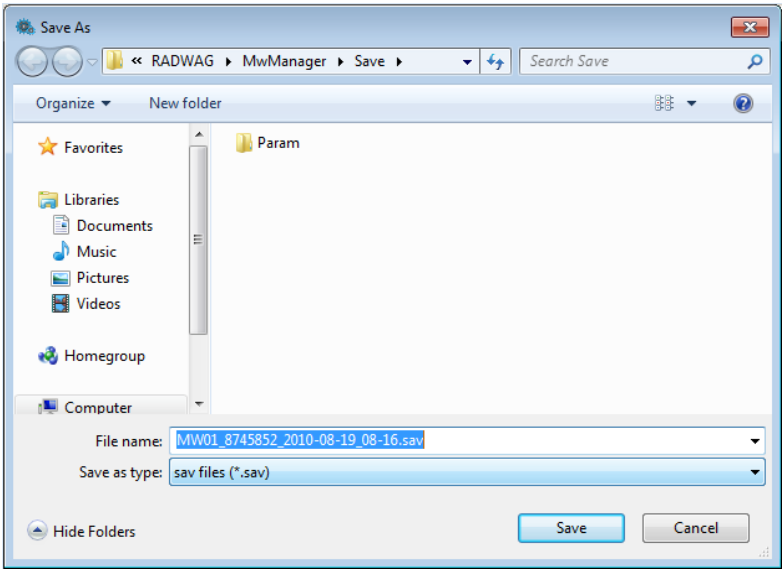
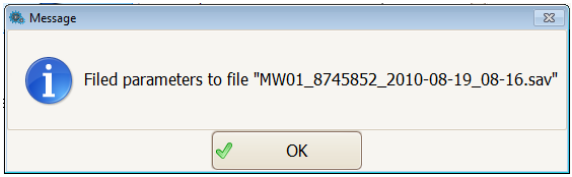


Fig.28 System window "Save as"

Default saving directory: **C:\Program Files\RADWAG\MwManager\Save**

- Correctly saved parameters cause displaying the below message box:



Caution:
The system window look depends on installed OS version, and may differ fro mthe one visible in Fig.28.

12.2. Uploading file data

Procedure:

- In order to upload parameters from a file, press Read from file key,
- Then, using system dialogue window, see fig. 29, select an earlier saved file, and press Open key

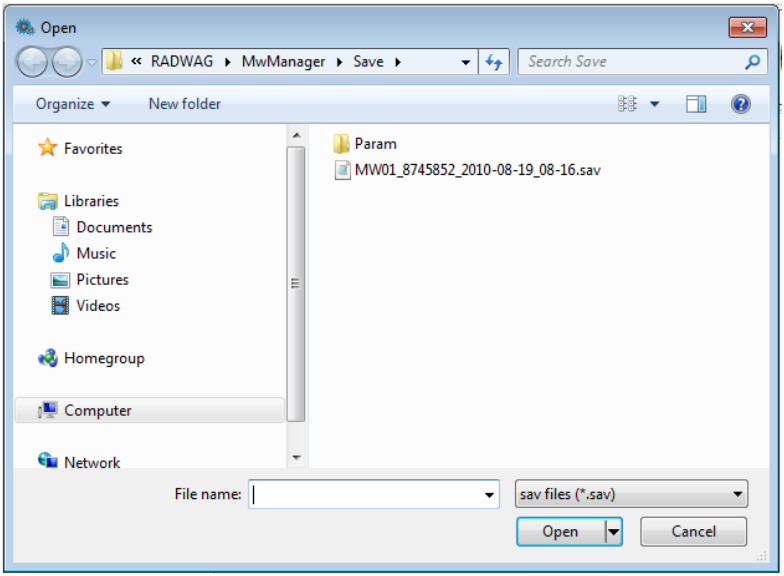


Fig.29 System window „Open”

- Next, using window for uploading groups of parameters select one or all parameters to be uploaded to the weighing module.

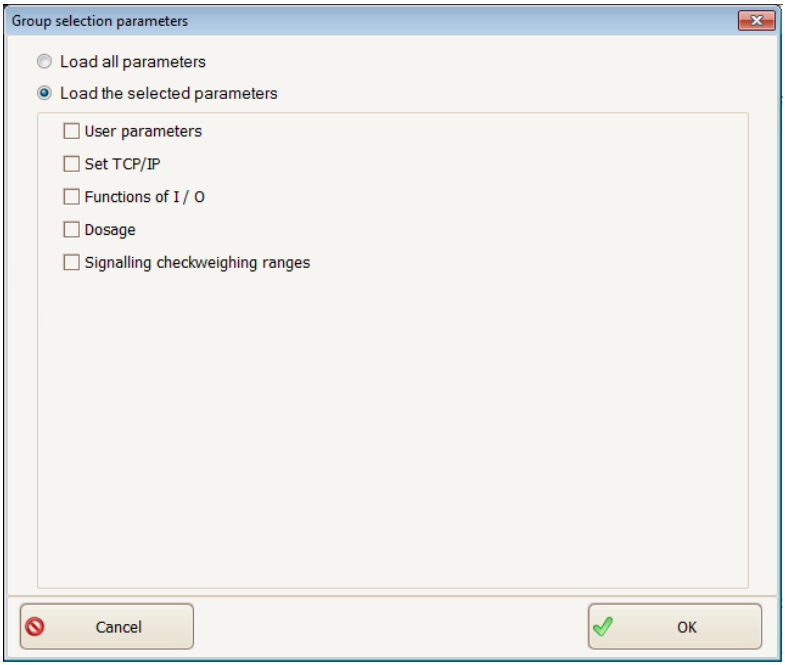
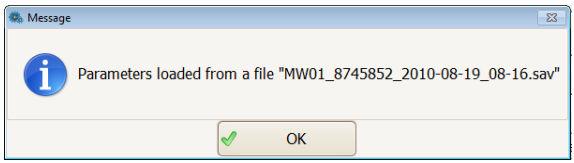


Fig.30 Window for selecting groups of parameters

The selected parameters are grouped according to their location in the main software menu.

- Parameters that are correctly uploaded are confirmed by the below message box:



13. OFFLINE MODE

The **Offline** mode enables starting different software options with no need to connect to a weighing module. This mode of connection is created to enable saving parameters without phsycial connecting to a weighing device.

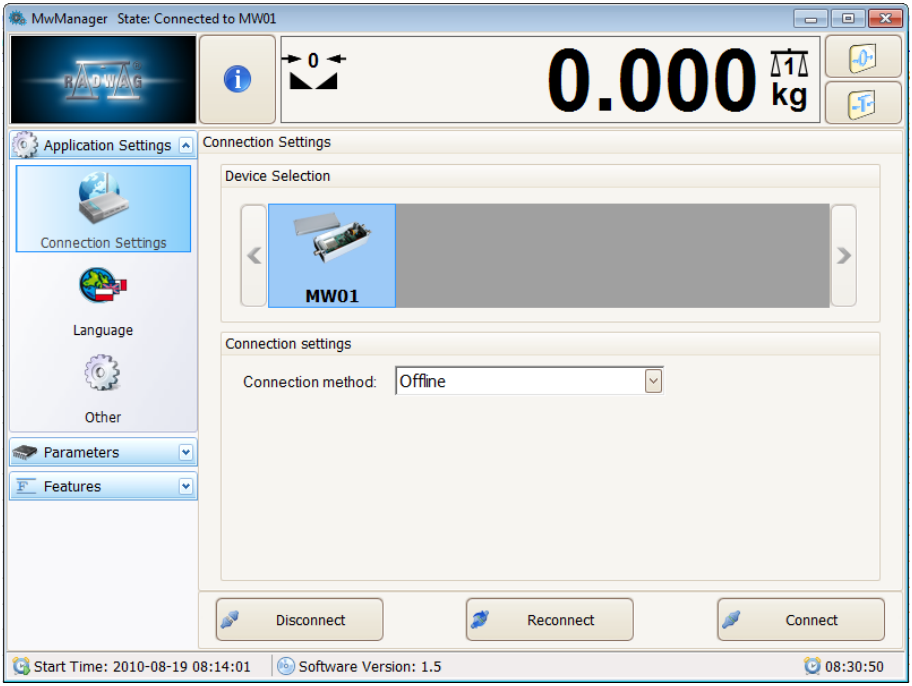


Fig. 31. Window for starting Offline mode.

Procedure:

- On software start, enter connection settings tab and in the connection settings options select **Offline**, and press

key,
- The weighing window displays a communicate as presented in Fig. 31,
- Set parameters and save them into a file according to description in section 12.1 of this manual.

14. COMMUNICATION PROTOCOL

14.1. General information

A. Serial communication protocol "weighing module – terminal" is designed for establishing communication between a MW-01 weighing module and a peripheral device through interfaces: RS232, RS485, Ethernet;

B. The protocol consists of commands sent from a peripheral device to the weighing module, and responses sent inversely;

C. The responses are sent from the weighing module on each receipt of a command. Each response is a reaction for a specific command;

D. Commands which form serial communication protocol enable checking device's status, and trigger its reaction, e.g. obtaining measurement result from the weighing module, preview mass displaying window, etc.

14.2. A set of commands

Commands	Description of commands
Z	Zeroing
T	Tarring
OT	Get tare value
UT	Set tare value
S	Send the stable result in basic unit
SI	Send the result immediately in basic unit
SU	Send the stable result in current unit
SUI	Send the result immediately in current unit
C1	Switch on continuous transmission in basic unit
C0	Switch off continuous transmission in basic unit
CU1	Switch on continuous transmission in current unit
CU0	Switch off continuous transmission in current unit
DH	Set lower threshold
UH	Set upper threshold
ODH	Read lower threshold
OUH	Read upper threshold
PC	Send all implemented commands

Notice:

1. *Each command have to be terminated in CR LF;*
2. *The best Policy for communication is not sending another command until the former answer has been received.*

14.3. Respond message format

After sending a request message you can receive:

XX_A CR LF	command accepted and in progress
XX_D CR LF	command completed (appears only after XX_A)
XX_I CR LF	command comprehended but cannot be executed
XX _ ^ CR LF	command comprehended but time overflow error appeared
XX _ v CR LF	command comprehended but the indication below the
XX _ OK CR LF	Command done
ES_CR LF	Command not comprehended
XX _ E CR LF	error while executing command – time limit for stable result exceeded (limit time is a descriptive parameter of the scale)

XX - command name
_ - substitutes spaces

14.4. Command's description

14.4.1. Zeroing

Syntax **Z CR LF**

Possible answers:

Z_A CR LF - command accepted and in progress
Z_D CR LF - command completed

Z_A CR LF - command accepted and in progress
Z_^ CR LF - command comprehended but zero range overflow appeared

Z_A CR LF - command accepted and in progress
Z_E CR LF - time limit for stable result exceeded

Z_I CR LF - command comprehended but cannot be executed

14.4.2. Tarring

Syntax: **T CR LF**

Possible answers:

T_A CR LF - command accepted and in progress
T_D CR LF - command completed

T_A CR LF - command accepted and in progress
T_v CR LF - command comprehended but tare range overflow appeared

T_A CR LF - command accepted and in progress
T_E CR LF - time limit for stable result exceeded

T_I CR LF - command comprehended but cannot be executed

14.4.3. Get tare value

Syntax: **OT CR LF**

Reply: **OT_TARA CR LF** – command executed

Frame format:

1	2	3	4-12	13	14	15	16	17	18	19
O	T	space	tare	space	unit			space	CR	LF

Tare - 9 characters justified to the right
Unit - 3 characters justified to the left

Notice:
Tare values are always send in calibration unit.

14.4.4. Set tare value

Syntax: **UT_TARE CR LF**, where **TARE** – tare value

Possible replies:

UT_OK CR LF - command completed
UT_I CR LF - command correct, but not accessible at the moment
ES CR LF - command incorrect (e.g. incorrect tare format)

Notice:
Use dots as decimal points in tare values.

14.4.5. Send the stable result in basic unit

Syntax: **S CR LF**

Possible answers:

S_A CR LF - command accepted and in progress
S_E CR LF - time limit for stable result exceeded

S_I CR LF - command comprehended but cannot be executed

S_A CR LF - command accepted and in progress
MASS FRAME - mass value in basic unit is returned

Frame format:

1	2-3	4	5	6	7-15	16	17	18	19	20	21
S	space	stability	space	sign	mass	space	unit			CR	LF

Example:

S CR LF – computer command
S _ A CR LF - command accepted and in progress
S _ _ _ _ - _ _ _ _ _ _ 8 . 5 _ g _ _ CR LF – command done, mass value in basic unit is returned.

14.4.6. Send the result immediately in basic unit

Syntax: **SI CR LF**

Possible answers:

SI_I CR LF - command comprehended but cannot be executed at the moment
MASS FRAME - mass value in basic unit is returned

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	I	space	stability	space	sign	mass	space	unit			CR	LF

Example:

S I CR LF – computer command
S I _ ? _ _ _ _ _ _ _ 1 8 . 5 _ k g _ CR LF - command done, mass value in basic unit is returned immediately.

14.4.7. Send the stable result in current unit

Syntax: **SU CR LF**

Possible answers:

SU_A CR LF - command accepted and in progress
SU_E CR LF - timeout while waiting for stable results

SU_I CR LF - command comprehended but cannot be executed

SU_A CR LF - command accepted and in progress
MASS FRAME - mass value in current unit is returned

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	space	stability	space	sign	mass	space	unit			CR	LF

Example:

S U CR LF – computer command
S U _ A CR LF - command accepted and in progress
S U _ _ _ - _ _ 1 7 2 . 1 3 5 _ N _ _ CR LF - command done, mass value in current unit is returned.

14.4.8. Send the result immediately in current unit

Syntax: **SUI CR LF**

Possible answers:

SUI_I CR LF - command comprehended but cannot be executed
MASS FRAME - mass value in current unit is returned immediately

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	I	stability	space	sign	mass	space	unit			CR	LF

Example:

S U I CR LF – computer command
S U I ? _ - _ _ _ 5 8 . 2 3 7 _ k g _ CR LF - command executed and mass returned

14.4.9. Switch on continuous transmission in basic unit

Syntax: **C1 CR LF**

Possible answers:

C1_I CR LF - command comprehended but cannot be executed

C1_A CR LF - command comprehended and in progress
MASS FRAME - mass value in basic unit is returned

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	I	space	stability	space	sign	mass	space	unit			CR	LF

14.4.10. Switch off continuous transmission in basic unit

Syntax: **C0 CR LF**

Possible answers:

C0_I CR LF - command comprehended but cannot be executed

C0_A CR LF - command comprehended and executed

14.4.11. Switch on continuous transmission in current unit

Syntax: **CU1 CR LF**

Possible answers:

CU1_I CR LF - command comprehended but cannot be executed

CU1_A CR LF - command comprehended and in progress

MASS FRAME - mass value in current unit is returned

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	I	stability	space	sign	mass	space	unit			CR	LF

14.4.12. Switch off continuous transmission in current unit

Syntax: **CU0 CR LF**

Possible answers:

CU0_I CR LF - command comprehended but cannot be executed

CU0_A CR LF - command comprehended and executed

14.4.13. Set lower threshold

Syntax: **DH_XXXXX CR LF**, where: **XXXXX** – mass format

Possible answers:

DH_OK CR LF - command executed

ES CR LF - command not comprehended (wrong mass format)

14.4.14. Set upper threshold

Syntax: **UH_XXXXX CR LF**, where: **XXXXX** – mass format

Possible answers:

UH_OK CR LF - command executed

ES CR LF - command not comprehended (wrong mass format)

14.4.15. Read lower threshold

Syntax: **ODH CR LF**

Possible answers: **DH_MASA CR LF** - command executed

Frame format:

1	2	3	4-12	13	14	15	16	17	18	19
D	H	space	mass	space	unit			space	CR	LF

Mass - 9 characters justified to the right
Unit - 3 characters justified to the left

14.4.16. Read upper threshold

Syntax: **OUH CR LF**

Possible answers: **UH_MASA CR LF** - command executed

Frame format:

1	2	3	4-12	13	14	15	16	17	18	19
U	H	space	mass	space	unit			space	CR	LF

Mass - 9 characters justified to the right
Unit - 3 characters justified to the left

14.4.17. Send all implemented commands

Syntax: **PC CR LF**

Possible answers:

PC_A_"Z,T,S,SI,SIA,SU,SUI,C1,C0,CU1,CU0,DH,ODH,UH,OUH,OT,UT, PC" – command executed, the weighing module has sent all the implemented commands.

15. COMUNICATION MODULE PROFIBUS

15.1. General information

Communication module Profibus ensures exchanging data between a superordinate controlling unit (master) and a weighing module MW-01 (slave) in accordance with protocol Profibus DP.

The superordinate unit (master):

- cyclically reads inputs signals fro mthe weighing module MW-01,
- cyclically saves outputs status to the weighing module MW-01.

Functions of Profibus communication with the weighing module MW-01:

- Mass readout from the weighing module
- Tarring the weighing module
- Zeroing the weighing module
- Reading module's status
- Reading current measuring unit
- Setting and reading tare value
- Setting and reading **LO** threshold value
- START / STOP of dosing process
- Setting and reading the value of bulk (fast) dosing threshold
- Setting and reading the value of fine (slow) dosing threshold
- Setting outputs status
- Reading the status of dosing process
- Reading inputs status
- Setting and reading **Min** threshold value
- Setting and reading **Max** threshold value

15.2. Setting instrument's address in a Profibus network

The address of the weighing module MW-01 in Profibus network has to be set in accordance with module addressing specification. (See point 7.3.2 of this user manual – „Communication settings"). Field ***module address*** is used to set corresponding address of the device in Profibus network.

15.3. Memory map

15.3.1. Output address

Address / Offset	0	1	2	3	4	5	6	7	8	9
0	M	M	M	M	T	T	T	T	J	J
1	S	S	LO	LO	LO	LO	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	ST	ST	SW	SW	MIN	MIN
7	MIN	MIN	MAX	MAX	MAX	MAX	DS	DS	DS	DS
8	DW	DW	DW	DW	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-

Table. 1

M - Mass for a platform, 4 bytes, float
T - Tare for a platform, 4 bytes, float
J - Current measuring unit of a platform, 2 bytes, word
S - Platform status, 2 bytes, word
LO - Lo threshold of a platform, 4 bytes, float
ST - Process status, 2 bytes, word
SW - Inputs status, 2 bytes, word
MIN - MIN threshold, 4 bytes, float
MAX - MAX threshold, 4 bytes, float
DS - Bulk (fast) dosing threshold, 4 bytes, float
DW - Fine (slow) dosing threshold, 4 bytes, float

15.3.2. Input address

Address / Offset	0	1	2	3	4	5	6	7	8	9
0	C	C	CP	CP	-	-	T	T	T	T
1	LO	LO	LO	LO	SW	SW	MIN	MIN	MIN	MIN
2	MAX	MAX	MAX	MAX	DS	DS	DS	DS	DW	DW
3	DW	DW	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-

Table. 2

C - command, 2 bytes, word
CP - command with a parameter, 2 bytes, word
T - Tare for a platform, 4 bytes, float
LO - Lo threshold of a platform, 4 bytes, float
SW - Outputs status, 2 bytes, word
MIN - MIN threshold, 4 bytes, float
MAX - MAX threshold, 4 bytes, float
DS - Bulk (fast) dosing threshold, 4 bytes, float
DW - Fine (slow) dosing threshold, 4 bytes, float

15.4. Description of variables

15.4.1. Output variables

Readout of output variables enables obtaining data on instrument's status.

Notice:
All output values, except for mass, are displayed in adjustment/calibration unit.

Name of output variable	address	length [word]	data type
mass	0	2	float
tare	4	2	float
unit	8	1	word
status	10	1	word

LO	12	2	float
process status	64	1	word
input status	66	1	word
MIN	68	2	float
MAX	72	2	float
bulk (fast) dosing threshold	76	2	float
fine (slow) dosing threshold	80	2	float

Table. 3

- **mass** – mass value in current unit is returned,
- **tare** – tare value in calibration/adjustment unit is returned,
- **unit** – determines current (displayed) measuring unit:

Unit \ Byte no.		B5	B4	B3	B2	B1	B0	Dec
g	gram	0	0	0	0	**1**	0	1
kg	kilogram	0	0	0	0	0	**1**	**2**
ct	carat	0	0	0	**1**	0	0	4
lb	pound	0	0	**1**	0	0	0	8
oz	ounce	0	**1**	0	0	0	0	16
N	Newton	**1**	0	0	0	0	0	32

- **status** – determines scale's status

Status bytes	Task	Dec
0	correct measurement (no error message from scale)	1
1	stable measurement	2
2	scale in zero indication	4
3	scale tarred	8
4	scale in second measuring range	16
5	scale in third measuring range	32
6	scale reports NULL error	64
7	scale reports LH error	128
8	scale reports FULL error	256

For instance:

byte no.	B8	B7	B6	B5	B4	B3	B2	B1	B0
value	0	0	0	0	1	0	0	1	1

The scale does not report an error, the measurement is stable in the second measuring range.

- **LO** – the value of **LO** threshold in calibration/adjustment unit is returned.
- **Process status** – determines the status of dosing process

Decimal value of a variable (Dec)	process status	byte no.	
		B1	B0
0	process disabled (inactive)	0	0
1	dosing start	0	1
2	dosing stop	1	0
3	end of dosing process	1	1

- **Inputs status** – determines the status of inputs in a weighing module MW-01:

input status		byte no.		Decimal value of a variable (Dec)
In2	In1	B1	B0	
OFF	OFF	0	0	0
OFF	ON	0	1	1
ON	OFF	1	0	2
ON	ON	1	1	3

- **MIN** – set value of **MIN Threshold** (in calibration/adjustment unit) is returned.
- **MAX** – set value of **MAX Threshold** (in calibration/adjustment unit) is returned.
- **Bulk (fast) dosing threshold** – set value of bulk (fast) dosing threshold (in calibration/adjustment unit) is returned.
- **Bulk (slow) dosing threshold** – set value if fine (slow) dosing threshold (in calibration/adjustment unit) is returned.

15.4.2. Input variables

Saving the input variables into the weighing module MW-01 enables controlling module's operation.

Notice:
All input values are set in reation to calibration/adjustment unit.

Name of input variable	address	length [word]	data type
command	0	1	word
complex command	2	1	word
Complex command parameters			
tare	6	2	float
LO	10	2	float
output status	14	1	word
MIN	16	2	float
MAX	20	2	float
bulk (fast) dosing threshold	24	2	float
fine (slow) dosing threshold	28	2	float

Table. 4

- **command** – basic command. Setting of an appropriate command's byte is directly responsible for carrying out a task, in accordance with below table:

command bytes	task	Dec
0	scale zeroing	1
1	scale tarring	2
5	dosing process start	32
6	dosing process stop	64

For instance:

0000 0000 0010 0000 – command carried out, dosing process start

- **complex command** - Setting of an appropriate command's byte is directly responsible for carrying out a task, in accordance with below table:

command bytes	task	Dec
0	setting tare value	1
1	setting **LO** threshold value	2
2	setting outputs status	4
3	setting **MIN threshold** value	8
4	setting **MAX threshold** value	16
5	setting the value of bulk (fast) dosing threshold	32
6	setting the value of fine (slow) dosing threshold	64

For instance:

0000 0000 0000 0010 – command carried out, LO threshold set to value given in LO parameter (address 10); See *Table 4*.

Notice:
A complex command requires setting an appropriate address parameter from 6 to 28. See Table.4.

- **tare** – complex command parameter – tare value (in calibration / adjustment unit).
- **LO** – complex command parameter – **LO** threshold value (in calibration / adjustment unit).
- **outputs status** – complex command parameter determining outputs status of the weighing module MW-01.

Output status			byte no.			Dec
Out3	**Out2**	**Out1**	**B2**	**B1**	**B0**	
OFF	OFF	OFF	0	0	0	0
OFF	OFF	ON	0	0	1	1
OFF	ON	OFF	0	1	0	2
OFF	ON	ON	0	1	1	3
ON	OFF	OFF	1	0	0	4
ON	OFF	ON	1	0	1	5
ON	ON	OFF	1	1	0	6
ON	ON	ON	1	1	1	7

- **MIN** - complex command parameter – **MIN threshold** value (in calibration / adjustment unit).

- **MAX** - complex command parameter – **MAX threshold** value (in calibration / adjustment unit).

- **bulk (fast) dosing threshold** – complex command parameter – the value of bulk (fast) dosing threshold (in calibration / adjustment unit).

- **fine (slow) dosing threshold** – complex command parameter – the value of fine (slow) dosing threshold (in calibration / adjustment unit).

Notice:
A command or a command with parameter is executed once on detecting its corresponding byte setting. Should a command with the same byte be re-executed, the byte must be reseted.

For instance:

command	address 1	address 0
tarring	0000 0000	0000 0010
zeroing command bytes	0000 0000	0000 0000
tarring	0000 0000	0000 0010

16. MODBUS COMMUNICATION PROTOCOL

16.1. Basic information

The weighing module MW-01 enables complete operation of programmable controllers (PLC), which communicate through Modbus protocol class 0. The weighing module in a network using modbus standard operates as slave on an accessible interfaces, ***RS485*** or ***Ethernet***. According to the standard, Modbus class 0, the device uses two functions:

- Read multiple registers (fc 3), for cyclic readout of signals from the weighing module,
- Write multiple registers (fc 16), for cyclic record of the weighing module statuses.

The weighing module MW-01 can operate in one of three modes:

- RS484 - RTU (device interface RS485, frame RTU),
- TCP/IP - RTU (device interface Ethernet, frame RTU),
- TCP/IP - Open ModBus (device interface Ethernet, frame Open Modbus).

The functionalitz of Modbus protocol is based on a scheme used in Profibus protocol, as described in point 15.3 and 15.4 of this user manual.

Caution:
*Modbus address offset in the module that cooperates with PLC controller is set to value **1,** i.e. deafult setting. In case of a weighing module cooperating with a test computer software, set the value to **0**.*

16.2. Addressing a device in ModBus network

Address of the weighing module MW-01 in modbus netowrk has to be set in accordance to module addressing specification. (see point 7.3.2 of this user manual – „Communication settings"). Use tab ***RS232/485,*** field ***module address*** to set address of a device appropriate for the Modbus network.

The default ***port*** of the Ethernet interface (TCP/IP) in Modbus network is set to 502.

16.3. Register tables in ModBus network

Numbers on the output and input register tables are described below, and they are compatible with the ***Offset of Modbus address*** set for value **0**. In case of a value setting from 0 do 255, add the set value of ***Offset of Modbus address*** to the output or input register number.

16.3.1. Table of output registers

The weighing module uses 42 addresses for function *Read* ***Holding Registers*** as listed in below table.

Name of output variable	address	Length [words	Data type	Read Holding Registers
Mass	0	2	float	0
				1
Tare	4	2	float	2
				3
Unit	8	1	word	4
Status	10	1	word	5
Lo	12	2	float	6
				7
N. A.	16	2	float	8
				9
N. A.	20	2	float	10
				11
N. A.	24	1	word	12
N. A.	26	1	word	13
N. A.	28	2	float	14
				15
N. A.	32	2	float	16
				17
N. A.	36	2	float	18
				19
N. A.	40	1	word	20
N. A.	42	1	word	21
N. A.	44	2	float	22
				23
N. A.	48	2	float	24
				25
N. A.	52	2	float	26
				27
N. A.	56	1	word	28
N. A.	58	1	word	29
N. A.	60	2	float	30
				31
Process status (Stop, Start)	64	1	word	32
Inputs status	66	1	word	33
Low threshold value	68	2	float	34
				35
High threshold value	72	2	float	36
				37
Bulk (fast) dosing threshold value	76	2	float	38
				39
Fine (slow) dosing threshold value	80	2	float	40
				41

N. A. – Register inactive.

16.3.2. Table of input registers

The weighing module uses 16 addresses for function *Write* ***Multiple Registers*** as listed in below table.

Name of input variable	address	Length [word]	Data type	Write Multipe Registers
Command	0	1	word	0
Command with parameter	2	1	word	1
N. A.	4	1	word	2
tare	6	2	float	3
				4
Lo	10	2	float	5
				6
Outputs status	14	1	word	7
MIN	16	2	float	8
				9
MAX	20	2	float	10
				11
Bulk (fast) dosing threshold	24	2	float	12
				13
Fine (slow) dosing threshold	28	2	float	14
				15

N. A. - Register inactive.

16.4. Software for controller PLC SIEMENS S7-300

Description of software Siemens S7-300.
The software enables communicating of the weighing module MW-01 with the Siemiens S7-300 controller through Open Modbus TCP protocol.
The software is designed for below hardware specification.
Unit CUP: S7-313 2DP (6ES7 313-6CE00-0AB0 /V1.0)
Communication processor: CP 343-1 (6GK7 343-1EX10-0XE0 / V2.0)

Minimum software requirements:
Programming environment: STEP 7 V5.4 + SP3
Additional libraries: SIEMENS OPEN MODBUS TCP

Description:
Exchanging data with a weighing module MW01 is carried out through data block **DB1** of the following structure.

Name	Type	Description
Data acquired from the MW01 weighing module when a flag is set to Read_Write = FALSE		
Mass	REAL	Mass from the weighing module
Tare	REAL	Tare value from the weighing module
Unit	WORD	Measuring unit from the weighing module
Status	WORD	Weighing status from the weighing module
LO	REAL	LO threshold the weighing module
Data saved to the MW01 weighing module when a flag is is set to Read_Write = TRUE		
CMD	WORD	Command without a parameter sent to the module
CMD_PARAM	WORD	Command with a parameter sent to the module
RESERVED	WORD	N/A
Tara1	REAL	Tare value for a command with a parameter
LO1	REAL	Value of LO threshold with a parameter
OutPutsState	WORD	Output status for a command with a parameter
MIN	REAL	Min value for for a command with a parameter
MAX	REAL	Max value for a command with a parameter
FastDosing	REAL	Value of bulk (fast) dosing threshold for a command with a parameter
SlowDosing	REAL	Value of fine (slow) dosing threshold for a command with a parameter
Read_Write	BOOL	Flag for switching between date readout and record

17. ERROR MESSAGES

Err2	-	Value beyond zero range
Err3	-	Value beyond tare range
Err8	-	Exceeded time of tarring / zeroing operation
NULL	-	Zero value from A/D converter
FULL	-	Measuring range exceeded
HI	-	Display range exceeded
LH	-	Start mass error, indication out of range (from -5% to +15% of start mass)

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